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SCIENCE NEWS-LETTER

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SERPENTS STANDING ON THEIR HEADS

Plumed Rattlesnakes Guarding Warriors' Temple

(See page 127)

Vol. XVIII No. 489

Psychologist Teaches Cats to Love Rats

Comparative Psychology

Early Acquaintance Best, Chinese Scientist Finds

A KITTEN may grow up to be a battling ratter, or it may go through life as a peaceable friend of the rat tribe. It all depends on the kitten's early experiences in this world.

This is shown by a Chinese psychologist, Zing Yang Kuo, of the University of Chekiang, who has brought up 59 kittens in his laboratory and has closely observed the introduction of every one of them to rats and mice in varying circumstances.

In a report of his cat and rat studies, which will appear in the forthcoming issue of the *Journal of Comparative Psychology,* he tells how some of the kittens were put in isolated cages at an early age, and were shielded for the first week of life from knowing that a creature like a rat existed. Other kittens were given rats or mice for social companions almost from birth. Still other baby kittens got an early introduction to the race war between cat and rat by watching their mothers expertly dispatch rats. Some of the kittens were brought up to be vegetarians and others had a more liberal cat diet of meat and fish along with milk and rice.

And all these differences in their babyhood affected the kitten's outlook on the rat as a cat problem.

Environment Influences Cats

Of the 21 kittens raised in an environment where their mothers killed rats, 85 per cent of the kittens killed a rat before reaching the age of four months. Of the 20 kittens kept in a ratless environment, only 45 per cent killed rats without being taught. None of the kittens raised with rats ever killed one of its playmates, or any rat of its kind. Only three of the 18 kittens so raised killed other kinds of rats.

Being vegetarian does not make a kitten less keen as a rat-hunter, the experiment indicated. But most of the vegetarian kittens would not eat the rats that they killed. In fact, after three to four months of a meatless diet, the vegetarian kittens refused any meat. Being hungry does not spur on a cat to rat-hunting the Chinese psychologist reports.

Their Behavior Complex

The cat is a small-sized tiger, equipped with a bodily machine fitted for capturing small animals, the Chinese psychologist points out. But the cat's potential career as a hunter is modified by its life conditions. The explanation that a cat hunts rats by "instinct" is entirely inadequate, according to this experimenter, who is "impressed by the fact that the behavior of the cat toward the rat is much more complex and much more variable than most psychologists would have thought."

The purpose of his investigations, which are still in progress, is to understand animal behavior sufficiently so that with all factors taken into account, an animal's behavior can be predicted.

"Our study shows that kittens can be made to kill a rat, to love it, to hate it, to fear it, or to play with it," he concludes. "In the future, with more refined methods, with more thorough investigation in this direction and with more knowledge of the physiology of the cat's behavior, we should be able to predict in mathematical terms how a given cat will react to a given rat at a given moment."

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Where is the Noise?

THERE is little excuse for pedestrians who become confused by the honking of automobile horns to right and left of them. In fact, in an office of a dozen telephones one should be able to tell readily which is ringing.

These are some applications of tests conducted by Dr. Donald A. Laird and Walter G. King in the Psychological Laboratory at Colgate University, Hamilton, N. Y., and reported in the *Journal of the Acoustical Society.*

Dr. Laird has found out just how acute is man's sense of the direction from which sound comes; and it is surprising what slight changes in direction people can detect. For example, if an automobile horn or telephone 100 feet away is moved three feet to either side a person should detect the change 80 times out of 100 trials.

In the experiments a head clamp held the subject still and a circular rule about a yard from the head and graduated in degrees gave the direction. A small ticker timed by a pendulum made the test noise.

Psychology

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The Answer Is

In This Issue

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Fortune for Man Who Can Make Rain

Invention

Many Devices Patented But They Will Not Work

IF you could make rain in any desired amount, to order, you would undoubtedly become, today, the most famous person in the world, besides earning a fabulous fortune.

The present severe drought has brought its usual crop of professional rain makers seeking to swindle the credulous farmer, who in his present desperate straits is willing to take a chance on almost anything that may bring relief to his sun baked, withering crops. No method has yet been devised which will produce rain in a sufficient quantity to make it practicable during a severe drought such as we are now having, but unfortunately not all farmers know this.

Cartridges and Torpedoes

Rain makers have been careful to protect their methods and devices by obtaining patents from the government. Daniel Ruggles obtained a patent in 1880 for making rain by sending up one or more balloons carrying explosive cartridges and torpedoes which are detonated by an electric wire trailing on the ground. His theory is that the explosion produces a concussive force which condenses the moisture in the air thus producing rain. There is actually no scientific basis in this theory. During the Great War immense quantities of explosives were detonated but no appreciable quantity of rain was caused by those explosions.

Another patent issued in 1891 to Louis Gathmann first forms rain clouds by spraying liquid carbon dioxide gas high up in the air. The evaporation of the carbon dioxide cools the air condensing the moisture it contains, forming a cloud and finally rain. This method appears to be very plausible at first, but in order to cool large quantities of air so as to produce any appreciable condensation of moisture, extremely large quantities of liquid carbon dioxide would have to be used, the cost of which would be too prohibitive. The rain thus produced would not save enough of the crops to pay for the expense involved.

Put Electricity in Air

Several patents have also been granted for balloons equipped with sharp metallic points in order to discharge the electricity in the air. John Potts, for instance, obtained a patent in 1913 for a balloon having many sharp spurs on its surface. These points are attached to a wire which is grounded. Another patent granted in 1918 uses a similar device. The inventor explains his theory in the following language:

"The atmosphere is known to contain transient zones of electrified air, and it is also known that aqueous particles constituting clouds are invariably charged with electricity, and that the potential distribution throughout such atmospheric zones and clouds is usually uneven. It is also known that the sign and the potential gradient of regions of the atmosphere are varied or altered by these charged zones of clouds.

"I have discovered that if the potential gradient between earth and such atmospheric zones and clouds is diminished or canceled, particularly at times preceding rainfall, or at times when rain is falling, rainfall is procured or stimulated."

Unfortunately although this theory sounds good it does not work out in practice to produce rain.

Numerous devices such as those we have just described are at present being offered to hundreds of farmers to break the drought. The officials of the United States Weather Bureau brand these devices as pure fakes, and the men who are enriching themselves at the farmer's misfortune are nothing but scoundrels.

The professional rain maker is a shrewd salesman who knows how to play on the credulity of human nature. He may, for example, enter into a contract with a farmer promising him rain in a week or ten days for which he is to receive five thousand dollars. The rain maker will then set up some formidable looking apparatus which discharges electric sparks or chemicals in the air. He may explode shells containing gunpowder or nitroglycerine. Under ordinary circumstances rain is bound to come sooner or later, and the rain maker can very well gamble on this chance, for he has nothing to lose. As soon as rain comes he credits the performance to himself and, of course, demands the sum specified in his contract.

Still at Mercy of Elements

Science has not yet discovered all the facts of meteorology. We are still at the mercy of the elements, just as our ancestors were, thousands of years ago, except that we have provided ourselves with better shelter. Until our knowledge of weather is more complete than it is at present, it will be almost impossible to control or to make rain when we need it, because we do not understand all the underlying causes. Until then, farmers can do nothing in times of drought, in spite of the claims of inventors or professional rain makers.

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Cottonseed, Cheap Pellagra Preventive

Public Health

COTTONSEED meal has been hailed as the cheapest source of the pellagra-preventive vitamin yet found in a statement by Dr. W. W. Skinner of the U. S. Bureau of Chemistry and Soils.

Besides being rich in the anti-pellagra vitamin G, cottonseed meal was found to be an important carrier of the anti-beriberi vitamin B.

Yeast is considered the richest source of both these vitamins, but yeast is costly. Now it may be possible to use the less expensive cottonseed meal in treating pellagra. This would be of great benefit to pellagra sufferers who have generally acquired the disease from improper diet due to poverty.

Pellagra is known as the hard-times disease throughout the South where it is prevalent. Yeast, and fresh milk, fish, lean meat and eggs, which all contain the pellagra-preventive vitamin, are costly and absent from the diet of the poorer classes, particularly during hard times.

Mr. Henry Stevens directed the studies which were carried on jointly by the Department of Agriculture and the National Cottonseed Products Association.

Science News-Letter, August 23, 1930

Splitting Seconds
With the World's Newest Clocks

Astronomy

By JAMES STOKLEY

WHEN your watch keeps time to within a minute a week, you probably think it's doing pretty well.

And so it is—for a watch; but the astronomer, keeping track of the movements of the heavenly bodies, the seismologist, checking up the tremblings of the earth, and many another scientist, in laboratory and observatory, demand timekeeping of a much higher order of accuracy.

Accurate measurement of time became possible in 1673. In that year the Dutch astronomer and physicist, Christian Huygens, published his famous book, "Horologium Oscillatorium," which contained the first description of the pendulum clock.

Now an English inventor, after years of work, has perfected a clock that carries the pendulum clock close to what are probably the farthest limits of its accuracy. Still more recently, an American physicist, working in a great New York research laboratory, has perfected a totally new form of clock. It dispenses with the pendulum entirely, though it is comparable in accuracy with the best of the pendulum clocks of a few years ago. It is the most radical improvement that has been made in clockmaking since the time of Huygens himself.

Vibrating Crystal

After the final cutting its 100,000 movements a second will help keep the latest clocks going.

Differences in Standard Clocks

Laymen are often surprised when they see the clocks of an observatory to find that they may be as much as several seconds fast or slow. Even the standard clocks of the nation, in an underground vault at the Naval Observatory in Washington, are not exactly on the second. As a matter of fact, they do not tell the kind of time we use in our daily lives, but sidereal time, or star time.

Astronomers measure time from the motion of the stars across the field of a special form of telescope, arranged to move only from north to south. Our ordinary time is based on the sun. The year as measured by sun time contains one day less than the year measured by star time, which means that the solar day is about four minutes longer than the sidereal day.

At the time of the vernal equinox in March, sidereal time and solar time are the same. But then the sidereal clock seems to gain four minutes a day, until, by the autumnal equinox in September, it is exactly 12 hours ahead of the solar clock. By the following March the two are again even.

All this happens because the earth revolves around the sun at the same time that it is rotating on its axis. The yearly motion of the earth in its orbit causes the apparent movement of the sun among the stars during the year. Each day it is about one degree farther east among the stars than it was the day before, so if we take the time from a sidereal clock, it seems to come to the meridian about four minutes later.

But even the sidereal clocks in an observatory do not ordinarily show correct sidereal time. They may be a second or so fast or slow, and the astronomers in charge do not worry about it. What they are interested in is the rate. The clock may gain or lose a second or two a day, but does it gain or lose the same amount every day, year in and year out? If the amount it changes from day to day remains constant, then the astronomer always knows just how much to add or subtract from the time on the clock face to get the exact time.

Astronomical clocks are delicate affairs. They are kept in hermetically sealed cases, in vaults in which the temperature varies less than a degree between winter and summer. Naturally, any interference with them, to set them, would interfere with their delicate adjustments, so they are rarely touched. The winding is accomplished electrically.

The great Galileo, who lived from 1564 to 1642, is generally given credit for discovering the fact that a pendulum always takes the same time to swing, no matter whether it is swinging in a large arc or a short one. But it was the Dutchman, Huygens, who first applied the principle to a clock.

Keeping the Pendulum Swinging

A freely swinging pendulum is the most accurate possible timekeeper. If it is kept at the same temperature, so that its length does not change, successive swings will be almost perfectly identical. But no matter how perfect the support, there is always some friction, so that no such pendulum will keep swinging indefinitely, not even if in a vacuum to prevent air friction.

Therefore, Huygens and all his successors have found it necessary to keep the pendulum going. In the ordinary clock this is done by an escapement which gives the pendulum a little push every second. This push introduces inaccuracies. If it were always made exactly at the

moment the pendulum is hanging vertically in the middle of its swing, all would be well. But no mechanism is perfect, and sometimes the push comes too early or too late, making the pendulum swing either too rapidly or too slowly.

During the years from 1673 to the beginning of the present century, refinements were made on Huygens' original design. These culminated with the Riefler clock, a German product that is still the U. S. standard at the Naval Observatory in Washington, where three are in use. The Riefler clock will maintain a constant rate within about a hundredth of a second a day, a degree of accuracy far more than ample for most practical purposes and even adequate for much scientific work.

But the quest after increased precision is a never ending one on the part of the people who make scientific instruments, so an Englishman, W. H. Shortt, invented a clock that has inaugurated a new order of precise time. He considered the freely swinging pendulum, and wondered if it couldn't be applied in some way.

The ordinary clock pendulum has to release the mechanism that supplies it with energy to keep it going, and this robs it of energy, and introduces another source of inaccuracy. If the pendulum had nothing to do but swing, then an almost perfect timepiece would result. But a clock, to be of use, must have hands, and a dial. How is a freely swinging pendulum to operate the mechanism to turn the hands?

Then Mr. Shortt got a brilliant inspiration. Why not have two pendulums, one a master, that had nothing to do but swing, the other a slave, that did all the work of operating the mechanism?

Slave Tells Time

He worked out a means of accomplishing this remarkable feat, and the present-day Synchronome clock is the result. The connections between the master and the slave pendulums are electric. The slave clock is itself a highly accurate electric timekeeper.

The free pendulum is mounted in a sealed case from which most of the air has been exhausted, and is started swinging when set up. Every 30 seconds the slave clock releases a tiny wheel which drops against a projection attached to the master pendulum. This provides just enough energy to keep it moving, but has hardly any appreciable effect on its accuracy.

The slave pendulum is set to lose about six seconds a day, as compared with the master, so that it loses about 1/480 of a second every 30 seconds. Every time the little falling wheel supplies energy to the master pendulum, it operates a magnet near the slave pendulum. This pulls down a little lever, which comes near a small spring mounted on the slave pendulum itself. As long as the slave is a bit ahead of the master, the spring is not touched, but soon the slave falls a little behind the master. Then the lever falls and strikes against the spring; the slave pendulum is speeded up a bit and on the next swing is again ahead of the master.

The two pendulums never differ more than 1/240 of a second, from one end of the year to the other, so that, within this amount, the slave clock is always exactly in accord with the free pendulum.

Such clocks have been installed in various European observatories, and some in America, but the most elaborate installation is in a private laboratory near New York City. This is the Loomis Laboratory, at Tuxedo Park, owned by Alfred L. Loomis, a New York banker. Mr. Loomis has already turned out a number of important pieces of scientific work, though the laboratory has been in operation only a few years. He has three complete sets of slave clocks and masters, together with an elaborate automatic radio receiver with which he can receive time signals from all over the world.

In spite of the accurate development of the pendulum clock a few years from now even this may be passé. At the Bell Telephone Laboratories, in New York City, a young physicist, Dr. W. A. Marrison, has invented a totally new form of clock. For the first time since 1673, he has dispensed with the pendulum itself in a highly accurate timepiece.

Primarily Dr. Marrison has been interested in a standard of frequency, rather than of time, but as a by-product his work has produced a clock that, without a pendulum, keeps time of accuracy comparable with that kept by a Riefler. So far, the Synchronome has some advantages on the Marrison device in point of precision. However, the great superiority of Dr. Marrison's invention comes from the fact that, not using a pendulum, it does not require as stable a support as the Riefler or Synchronome clocks. The latter clocks must be kept on firm piers of brick or concrete, preferably in an underground chamber, away from vibration. The Marrison clock can be used in a tall office building, on board a ship, or even in an airplane if necessary, so that it will do the work of a chronometer, but with far greater precision.

The control of the Marrison clock is accomplished by a crystal of

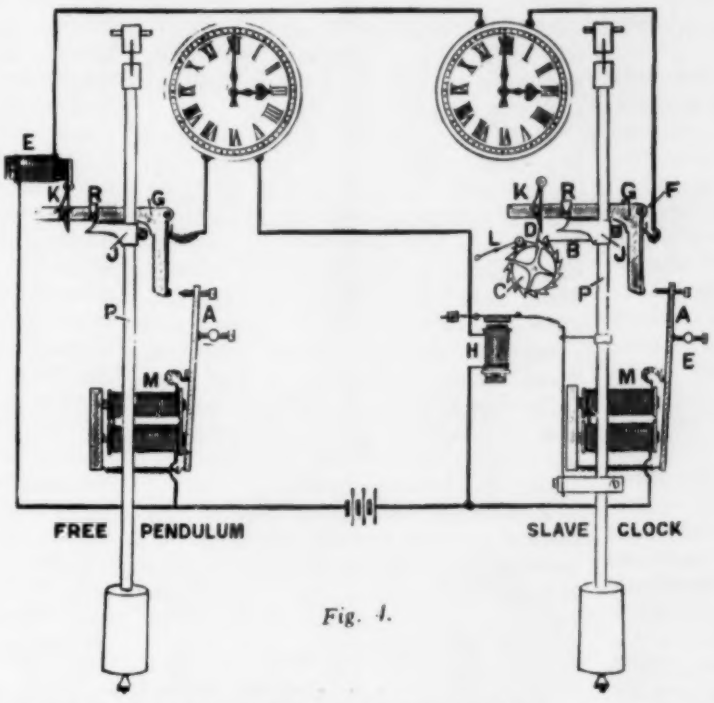

Fig. 1.

The long-known principle of the pendulum is most accurately applied in the Shortt Synchronome clock. A free pendulum swings to keep time and a slave clock does the work of turning the hands.

quartz. When an oscillating electric current is applied to two metal plates, between which is a quartz crystal of the proper size, the crystal starts vibrating. A single crystal, cut a certain size and shape, always vibrates at the same rate, when excited by an electric current oscillating at this rate.

If a current oscillating at a different frequency is applied to the plates, the crystal fails to vibrate. Such a crystal may be used to control an oscillating current, and as such finds practical application in radio. Many broadcasting stations are "crystal controlled," which means that such a crystal keeps them from deviating from the frequency, or wavelength, assigned by Uncle Sam.

As Dr. Marrison has set up the experimental apparatus in New York, three crystals are used, each vibrating a hundred thousand times a second. Each is enclosed in a padded case to keep the temperature constant, and covered with a bell jar to prevent changes in air pressure of humidity. Each crystal is connected with an oscillating circuit from vacuum tubes, which keeps them running.

Any crystal can be connected with the clock through the medium of an electrical circuit called a "submultiple generator." Thus from the crystal there comes a current oscillating exactly 100,000 times a second, which is fed into the submultiple generator. Out of this comes a current of one one-thousandth of the frequency, that is, oscillating a thousand times a second. The current operates a 1,000-cycle motor that is geared to the hands of the clock face. Already, over short runs, Dr. Marrison has found that the clock rate keeps within a hundreth of a second a day, about the same as that of the Riefler.

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"Ruins" of Nature

THE reported discovery of "ruins of a large stone city containing hundreds of buildings" about 100 miles from San Diego, has been investigated by Spencer L. Rogers, curator of anthropology of the San Diego Museum, who reported to Science Service that the stone "city" was built by nature, and not by prehistoric Indians.

The site with its irregular stone formations was once chosen by Indians as a convenient ready-made place for a habitation, Mr. Rogers found.

Archaeology

Science News-Letter, August 23, 1930

Train Dispatchers With Shifting Eyes

Medicine

DISCOVERY of a new occupational disease among railway train dispatchers in America was made by the Industrial Health Conservancy Laboratories of Cincinnati according to information made public by Dr. Carey P. McCord.

Of a group of 165 dispatchers from seventeen different railroads examined, two-thirds were afflicted with an involuntary to and fro shifting of the eyes which is the characteristic symptom of nystagmus, as the new disease is called.

Until the present time, America has been regarded as free of this occupational menace, which has taken a great toll of mine workers in England since its discovery there. Its exact cause is not definitely known, some authorities attributing the disease to deficient illumination and others to the eye strain resulting from constant motion of the eyes following objects in motion, as the eye of a miner follows the point of his pick or the sewing machine operator watches her needle.

Explaining the appearance of the optical ailment among the train dispatchers, the fatigue theory has been forwarded as more logical and continued use of a train sheet blamed for the eye strain.

Reports from the U. S. Public Health Service of Washington state that previous to this time practically no evidence of nystagmus has been discovered in this country. The Illinois commission examined 500 pick men in the mines of that state but did not find a single victim. From this it was assumed that superior hygienic working conditions in the United States rendered the American laborer immune from the disease that was cutting into the ranks of English workmen, often incapacitating them for work in the prime of life.

Naturally strong eyes appear to be no guarantee against the inroads of nystagmus. Dr. J. W. Tudor Thomas of the Cardiff Royal Infirmary found from a study of five hundred cases of nystagmus among miners, that as many workers originally blest with normal vision had been afflicted with the disease as had workmen with defective eyesight.

Neurotic tendencies, alcoholism, and anemia are thought to be factors increasing the hazard of nystagmus. That the workers in coal mines are the most frequent sufferers further suggests that the absence of colors may in some mysterious way react unfavorably on the eyes.

Science News-Letter, August 23, 1930

Beautiful New Waterfalls in Africa

Geography

A SERIES of gorgeous waterfalls never before seen by a European and practically unknown to natives have been discovered in South Africa by Farquhar B. Macrae of the Northern Rhodesian Civil Service and described by him in a report to the Royal Geographical Society.

One of the falls is 200 feet in height, or 33 feet higher than the Niagara Falls, and rivals in beauty the Famous Victoria Falls which are about twenty miles distant. This fall is, however, only one of a series following each other in rapid succession so that the total effect is that of a much greater drop totalling 334 feet. They are known to the natives as the Chiengkwasi Falls and are on the Chunga River which empties into the Zambezi. It is on the Zambezi River that the Victoria Falls are located. In describing the Chiengkwasi, Mr. Macrae says:

"The main Chiengkwasi fall is a fine sight. Numerous very green ferns grow in holes and cracks in the stone and the water dashes down over the smooth face of the rock, spurting out into little plumes of spray wherever it meets an obstacle. In times of flood it must be an awe-inspiring sight during the few hours that such a short river would remain at its maximum height."

A few miles from the Chiengkwasi Mr. Macrae found another impressive series of five falls. The largest of these was a drop of 83 feet.

"Below this fall the scenery is most imposing," he continues, "Towering basalt precipices rise on either side of the river, which is never much more than 100 feet broad and is generally considerably narrower. At one point the cliffs cannot well be less than 400 feet high and are probably higher. They rise in one sheer wall from the water's edge. The general impression of height is greater than that conveyed to an observer standing at the bottom of the Palm Grove at the Victoria Falls."

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Hrdlicka Studies Original Eskimos

Anthropology

They Were Once Indians, Smithsonian Scientist Finds

DISCOVERY of the old, original Eskimo type, and the equally remarkable discovery that the type still lives in an isolated part of Alaska is reported by Dr. Ales Hrdlicka, anthropologist of the Smithsonian Institution, who has just returned from an expedition to the practically inaccessible region of the Kuskokwim River. These people are also definite evidence that the Eskimos were Indians.

In that region, never before visited by any one who might make a scientific study of the people, Dr. Hrdlicka found 3,000 Eskimos, a great many of whom he measured. He also unearthed many ancient burials, centuries old, and measured these skeletal remains of the earlier generations of these isolated Eskimos.

Unchanged Through Centuries

The results show a type that has remained constant through centuries, and Dr. Hrdlicka declares that it seems now that this is the old original type of Eskimo from which the other deviations have developed. This type of Eskimo has been occasionally found in the Bering Sea region, but its significance was never explained. These oldest Eskimos lack the extraordinary facial development and outstanding jaws which are characteristic of Eskimos that wandered to Greenland and other Arctic regions. The necessity of chewing skins and the kind of food eaten by the Arctic tribes is held responsible for the highly specialized head shape usually thought of as typically Eskimoid.

The Eskimos of the Kuskokwim show clearly that the Eskimo was originally an Indian. Many of these Eskimos, especially in the old, long-buried generations, have heads that cannot be distinguished from Indian except by the skilled expert, Dr. Hrdlicka states. Thus, any question that the Eskimos are of a different and distinct race is set definitely at rest, he believes.

Poor and Happy

The Eskimos of the Kuskokwim have always been poor, judging from their possessions. Their home land lacks proper materials for fine workmanship. But in spite of their hard life, these Eskimos are the happiest people on earth, the anthropologist reports. Many of the young men and women are attractive by the white man's standards of good looks.

The only serious disease among these cheerful people is tuberculosis, but this one malady afflicts no less than one person in every three among them, it was found. One doctor and one nurse attended approximately 1,000 of these tuberculous Eskimos.

Should Be Cared For

"Everything possible should be done for this group of people," Dr. Hrdlicka states. "At present they are not diminishing, for they have large families. But if tuberculosis conquers them, their land will revert to wilderness, for it is not a white man's land."

These Eskimos live as far as 400 miles up the river from the bay, and Dr. Hrdlicka penetrated this region as far as the groups were to be found. The work of replacing old, hazy theories with solid facts about the native people of Alaska goes forward surely, but slowly, Dr. Hrdlicka explains, for the season when exploration and digging can be achieved is only a few months of each year. Besides the measurements of Eskimos, Dr. Hrdlicka has brought back important collections which fill about 50 boxes.

Science News-Letter, August 23, 1930

New Device To Measure Ceiling

Meteorology—Aviation

© Harris & Ewing

Dr. Marvin sighting through the clinometer which he has designed

THE clinometer, a simple device which enables one man quickly to determine the aviator's ceiling at night has been designed recently by Dr. C. F. Marvin, chief of the U. S. Weather Bureau, and is being put in use at government flying fields.

It is used in connection with a search light focused vertically on the clouds. At a certain distance from the light, often 1,000 feet, the observer sights the clinometer on the white spot on the clouds and measures the angle of sight with a pendant which hangs on a scale attached to the instrument. Then with the ground distance and angle of sight known, the vertical height of the clouds can be readily calculated as the leg of a right triangle.

In the day time ceiling height is usually measured by sending up a balloon. A crude instrument depending on the same principles applied in the clinometer has been used in the past to make this determination by night.

Science News-Letter, August 23, 1930

Iodine For Plants

IODINE, which has figured largely as "good medicine" for man and beast during the past few years, now assumes a similar role for plants.

Investigations by the bureau of plant industry of the U. S. Department of Agriculture have shown that a small amount of iodine added to the soil produces a better growth of tobacco and an improvement in its quality.

Plant Physiology

Science News-Letter, August 23, 1930

An amplifier to increase the volume of tone from a violin or cello has been tested and pronounced satisfactory.

Trolley cars capable of a speed of 60 miles an hour are being put in use.

Why More Appendicitis?

FAD DIETS, modern habits of living, self-prescription and over use of laxative medicines and mineral oils, and infection, either directly or from foci, are among the possible causes suggested by doctors to explain the sharp rise in the appendicitis mortality rate during the last nineteen years. In 1928, more than 18,000 deaths in the United States were attributed to this cause alone.

Reports issued by the Metropolitan Life Insurance Company, based on records of policyholders, show an increase of 20 per cent. in the death rate for white males and a 14 per cent. increase for white females during the last five years of this nineteen-year period as compared with the first five years. More men died from appendicitis during the entire period than did women and apparently they are becoming increasingly susceptible to the disease.

Among adults of both sexes, older persons are being worse hit as the years go by, though even children under five have not been spared in the advance of appendicitis fatalities. Only the ages from 10 to 19 years have proved an exception to the general rule that appendicitis deaths are increasing in the face of modern science.

Why this should be, doctors are frank to admit their bewilderment. During the nineteen years there has been immense improvement in surgical technique and focus of interest by the public and physicians on the disease has insured early diagnosis thereby improving conditions for recovery but still the fatalities grow.

Medicine

Science News-Letter, August 23, 1930

When People Cable

MOST cablegrams are sent out by business offices at the same time they send out most of their mail—at the end of the day. This fact was brought out by Hobart Mason, of the Western Union Telegraph Company, speaking in Toronto before the Institute of Radio Engineers on recent advances in cable technique.

The peak of the daily eastward traffic comes about 6:00 p. m., eastern standard time. Mr. Mason suggested that the difference in time partly explained this, for if a cablegram in New York was not filed before noon, it would not ordinarily be delivered in London until the following morning. However, he said, this is quite different from landline telegraph business, which shows almost equal peaks at 10 a. m. and 3 p. m. He expressed the opinion that the attitude of the public in this connection is hardly logical, as round trip communications could easily be handled in a single day. In fact, he stated, in arbitrage business two or three minutes are often sufficient for sending a cablegram and receiving a reply.

One great improvement that has been effected since 1918, he said, is in the elimination of manually operated repeater stations. Previously it was necessary to have several stations where the signals were received by an operator who then put them on the next step. Today, however, direct cable communication is maintained between New York and London, Liverpool, Berlin, Paris, Havre, and between Boston and London. A demonstration has even been made of direct communication between San Francisco and London, though traffic conditions do not warrant this in general practice.

Mr. Mason also called attention to the reduction in rates since the first cable was laid in 1858. In 1866 it cost a minimum of $100 to send a ten-word message or less from New York to London. By 1869 tolls were reduced to $10 for a ten-word message. In 1872, the rate was made a flat dollar a word, in 1880, 50 cents a word and in 1923, 20 cents a word, which it is at present.

Telegraphy

Science News-Letter, August 23, 1930

Atomizing Oil Pumps

PETROLEUM is brought from the bottom of deep wells to ground surface by atomizing it with air or gas in a new turbine air-lift pump said to be the invention of Ralph H. Tucker. Crooked wells that curve or spiral their way downward, which are very difficult to pump with sucker rods, can be robbed of their oil as easily as a straight shaft by the new atomizing process.

The air-lift pump is operated by air or gas pressure applied to an enclosed area in the bottom of the tubing. Air enters the pump through angular slots which turn a motor similar to a steam turbine. Oil is picked up by the motor; it strikes the air column at the top of the pump and is completely atomized. At the surface oil and air are separated in tanks.

Hydraulics

Science News-Letter, August 23, 1930

IN VARIOUS FI

Irritating Refrigerant

THE addition of acrolein, an irritating gas used in the World War, to methyl chloride when used in household refrigerators will make it impossible for a person to remain near a leak long enough to be injured by the poisonous gas, which has in the past caused several deaths.

Experiments conducted by the U. S. Bureau of Mines at the request of the manufacturers of electric refrigerators and methyl chloride, indicate that one part of acrolein to a million parts of air will produce a decided irritation of the eye and nose in two minutes and will become practically unbearable within five minutes. Exposure to even a bad leak of methyl chloride for that length of time does not cause apparent harm.

Acrolein is that acrid, irritating stuff familiar to the housekeeper who has ever allowed fat to spatter on a hot stove or who has forgotten the kerosene lamp and let it burn low and smolder. In the chemical laboratory it is made from glycerin.

Chemistry

Science News-Letter, August 23, 1930

Weakest at Night

MOST radio fans look forward during the day to night as the time their sets work best and the signals are loudest. But with the low frequency, or long wave, transmission used in commercial traffic the day time signals are ordinarily the louder.

At the meeting of the Institute of Radio Engineers in Toronto, Canada, Dr. G. W. Pickard, P. A. de Mars and G. W. Kenrick, the latter two of Tufts College, told of their studies of signal strength as recorded in Massachusetts of the transmission of station WCI, at Tuckerton, N. J. This station, operated by the Radio Corporation of America, uses a frequency of 17.8 kilocycles, which is equal to a wave length of 16,840 meters.

At sunset and sunrise, however, the signals show greatest strength. An inversion of this state of affairs was found during magnetic storms. Then the daytime signals were weaker and the night-time ones stronger.

Radio

Science News-Letter, August 23, 1930

SCIENCE FIELDS

Finger Nail Sign

FINGER nails tell the story of a patient's winning or losing fight against tuberculosis, recent observations by Dr. A. G. Hahn at the Trudeau Sanatorium near Saranac Lake have shown.

Pitted nails were found in every one of fifty cases of active tuberculosis investigated, while 50 ex-patients and normal subjects exhibited smooth nails. A third group, comprised of 50 cases of inactive tuberculosis, yielded only three instances of indented nails.

Downward curving of the finger nails is another symptom of lung disease, though not quite so accurate an index of its progress. Seventy-six per cent. of the patients with active tuberculosis had down-curving nails, as did half of the inactive cases. Thirty per cent. of the ex-patients had retained the incurvation after a cure had been effected but none of the normal group had the peculiarity.

Extreme blueness of the finger nails is another symptom of the progress of tuberculosis. The bluer the nails, the more advanced the case was usually found to be.

Inkling of this striking correspondence between the appearance of the finger nails and the condition of the lungs was first noted by the ancient Greek physician, Hippocrates, but modern scientific methods have made possible an accurate testing of his opinion.

Medicine

Science News-Letter, August 23, 1930

Magnetic Storms

A RING of electric current, surrounding the earth in very much the same way as the more material rings of Saturn surround that planet, is seen as the cause of the magnetic storms that sometimes occur, upsetting cable and telegraphic communication. This suggestion is made by two English physicists, Dr. S. Chapman and V. C. A. Ferraro, of the Imperial College of Science. They have announced their theory through the pages of *Nature*.

This current occurs, according to their theory, in a stream of neutral ionized particles shot out from the sun. As the stream advances towards the earth the magnetism of that body sets up electric currents in the stream, in its forward surface. The stream then proceeds to envelop the earth, possibly approaching as close as the upper layers of the atmosphere. The flow of the current in a westerly direction in the part of this stream around the earth then sets up magnetic effects that produce the main phenomena of a magnetic storm.

The authors of the theory point out that one of its distinctive features is that the current is close to the earth, only a few times its radius away. After the current ring is formed, they say, it could persist for several days, even after the flow of particles from the sun has ceased.

As magnetic storms are frequently associated with sun spots, it would seem therefore that these particles are shot out of the spots, though this is not mentioned in the announcement of the theory. It is suggested, however, that the stream approaches the earth with a speed of about 1000 kilometers (620 miles) per second. This would take it across the 92,900,000 miles separating the sun and the earth in about 40 hours.

Terrestrial Magnetism

Science News-Letter, August 23, 1930

Forested by Man

MODERN Denmark is a country of man-made forests. Only about eight per cent. of its territory is wooded, and about two-thirds of that fraction consists of evergreens planted by man: wholly artificial forests. The remaining third consists of almost pure stands of beech. These were originally native forests of mixed timber, but due to selective cutting almost nothing but beech is left.

The problems of foresty in an almost forestless country were presented by Prof. C. H. Ostenfeld of the University of Copenhagen, before the recent International Botanical Congress.

Danish foresters, Prof. Ostenfeld says, do not really like the pure beech forests, for beech trees are exahusting to the soil, and are not such valuable timber as some of the trees they have replaced in the course of the centuries. However, the highly valuable oaks were all cut out many years ago, and the beeches did not permit them, nor any of the other hardwood species that went with them, to develop again.

Forestry

Science News-Letter, August 23, 1930

Pneumonia Kills Snakes

INVESTIGATION of the death of poisonous snakes shown at the Minneapolis Museum, sponsored by the Minnesota Academy of Science, has led to the conclusion that poisonous snakes are susceptible to pneumonia and typhoid while harmless snakes are not affected by those diseases.

Poisonous snakes at the museum have been dying off of late of a strange disease and, for a while, the identity of the disease could not be determined. The museum sent some of the snakes to Iowa State College, where Roger Patrick, graduate assistant in bacteriology, has been experimenting and has attributed the death of the snakes to typhoid and pneumonia-like diseases. These diseases were never before known among snakes.

Whether or not the snakes die of pneumonia and typhoid, Mr. Patrick has found organisms corresponding to those causing typhoid and pneumonia. However, it is thought that these organisms are not pathogenic, or disease-producing, to human beings because of the difference in body temperature.

"If these organisms which are causing the death of the snakes can be isolated in such a way that they can be used to poison food, we can employ them in the destruction of harmful snakes," says Mr. Patrick.

Zoology

Science News-Letter, August 23, 1930

More Babies Live

BABIES born in cities of the United States are getting a better break in the struggle for existence than babies did a few years back. This is shown in a report just issued by the American Child Health Association. In 1929 there were 66.2 deaths among 1,000 births in 720 cities of the birth registration area.

At the start of the World War, less than a generation back, the rate was close to 100. It has been declining ever since. The banner year for the country was 1927, when the rate dropped to 64.9, but the past year was the best on record in a number of cities, including Chicago, Philadelphia, Detroit, Boston, and Baltimore. As a group, cities of the Pacific coast hold the lead in keeping down the infant death rate, the report shows.

Public Health

Science News-Letter, August 23, 1930

THE PALACE OF MINOS. By Arthur J. Evans, in the Monthly Review, Vol. II. January-March, 1901. London.

The Labyrinth of Minos —A Classic of Science

Archaeology

GUIDED by the unearthed walls, steps and porticoes on the hill above Knossus, the artist has drawn the palace of Minos as Theseus may have seen it, or at least as it was just before the town was deserted. Since the discovery of the ruins, archaeologists have learned that no human enemy, but a destructive earthquake, laid waste this ancient center of civilization. The Minoans thought it was caused by the plunging and bellowing of the angry bull-god. Fear caused them to leave the site forever.

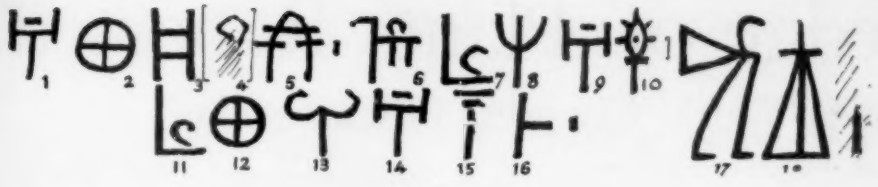
HERE, in his royal city of Knossos, ruled Minos, or whatever historic personage is covered by that name, and founded the first sea empire of Greece, extending his dominion far and wide over the Ægean isles and coast lands. Athens paid him its human tribute of youths and maidens. His colonial plantations extended east and west along the Mediterranean basin till Gaza worshipped the Cretan Zeus and a Minoan city rose in western Sicily. But it is as the first lawgiver of Greece that he achieved his greatest renown, and the code of Minos became the source of all later legislation. . . .

If Minos was the first lawgiver, his craftsman Daedalus was the first traditional founder of what may be called a "school of art." Many were the fabled works wrought by them for King Minos, some grewsome, like the brass man Talos. In Knossos, the royal city, he built the dancing ground, or "choros," of Ariadne, and the famous labyrinth. In its inmost maze dwelt the minotaur, or "bull of Minos," fed daily with human victims, till such time as Theseus, guided by Ariadne's ball of thread, penetrated to its lair, and, after slaying the monster, rescued the captive youths and maidens. . . .

From 1894 onward I undertook a series of campaigns of exploration chiefly in central and eastern Crete. In all directions fresh evidence continually came to light—Cyclopean ruins of cities and strongholds, beehive tombs, vases, votive bronzes, exquisitely engraved gems—amply demonstrating that in fact the great days of that "island story" lay far behind the historic period. From the Mycenean sites of Crete I obtained a whole series of inscribed seals, such as I had first noticed at Athens, showing the existence of an entire system of hieroglyphic or quasi pictorial writing, with here and there signs of the coexistence of more linear forms. From the great cave of Mount Dicta —the birthplace of Zeus—the votive deposits of which have now been thoroughly explored by Mr. Hogarth, I procured a stone libation table inscribed with a dedication of several characters in the early Cretan script. But for more exhaustive excavation my eyes were fixed on some ruined walls, the great gypsum blocks of which were engraved with curious symbolic characters, that crowned the southern slope of a hill known as Kephala, overlooking the ancient site of Knossos, the city of Minos. They were evidently part of a large prehistoric building. Might one not uncover here the palace of King Minos—perhaps even the mysterious labyrinth itself?

The Plan of the Palace

The result has been to uncover a large part of a vast prehistoric building—a palace with its numerous dependencies, but a palace on a far larger scale than those of Tiryns and Mycenae. About two acres of this has been unearthed, for, by an extraordinary piece of good fortune, the remains of walls began to appear only a foot or so, often only a few inches, below the surface. This dwelling of prehistoric kings had been overwhelmed by a great catastrophe. Everywhere on the hilltop were traces of a mighty conflagration; burnt beams and charred wooden columns lay within the rooms and corridors. There was here no gradual decay. The civilization represented on this spot had been cut short in the fullness of its bloom. Nothing later than remains of the good Mycenean period was found over the whole site; nothing even so late as the last period illustrated by the remains of Mycenae itself. From the day of destruction to this the site has been left entirely desolate. For three thousand years or more not a tree seems to have been planted here; over a part of the area not even a plowshare had passed. At the time of the great overthrow, no doubt, the place had been methodically plundered for metal objects, and the fallen debris in the rooms and passages turned over and ransacked for precious booty. Here and there a local bey or peasant had grubbed for stone slabs to supply his yard or threshing floor. But the party walls of clay and plaster still stood intact, with the fresco painting on them, still in many cases perfectly preserved at a few inches depth from the surface, a clear proof of



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how severely the site had been let alone for these long centuries. . . .

The palace was entered on the southwest side by a portico and double doorway opening from a spacious paved court. Flanking the portico were remains of a great fresco of a bull, and on the walls of the corridor leading from it were still preserved the lower part of a procession of painted life-size figures, in the center of which was a female personage, probably a queen, in magnificent apparel. This corridor seems to have led around to a great southern porch or Propylaeum with double columns, the walls of which were originally decorated with figures in the same style. Along nearly the whole length of the building ran a spacious paved corridor, lined by a long row of fine stone doorways, giving access to a succession of magazines. On the floor of these magazines huge stone jars were still standing, large enough to have contained the "forty thieves." One of these jars, contained in a small separate chamber, was nearly 5 feet in height. . . .

On the east side of the palace opened a still larger paved court, approached by broad steps from another principal entrance to the north. From this court access was given by an anteroom to what was certainly the most interesting chamber of the whole building, almost as perfectly preserved—though some twelve centuries older—as anything found beneath the volcanic ash of Pompeii or the lava of Herculaneum. Already a few inches below the surface freshly preserved fresco began to appear. Walls were shortly uncovered decorated with flowering plants and running water, while on each side of the doorway of a small inner room stood guardian griffins with peacocks' plumes in the same flowery landscape. Round the walls ran low stone benches, and between these on the north side, separated by a small interval and raised on a stone base, rose a gypsum throne with a high back, and originally colored with decorative designs. Its lower part was adorned with a curiously carved arch, with crocketed moldings, showing an extraordinary anticipation of some most characteristic features of Gothic architecture. Opposite the throne was a finely wrought tank of gypsum slabs—a feature borrowed perhaps from an Egyptian palace—approached by a descending flight of steps, and originally surmounted by cyprus-wood columns supporting a kind of impluvium. . . .

The frescoes discovered on the palace site constitute a new epoch in the history of painting. Little, indeed, of the kind even of classical Greek antiquity has been hitherto known earlier at least than the pompeiian series. The first find of this kind marks a red-letter day in the story of the excavation. . . .

The Written Language

But manifold as were the objects of interest found within the palace walls of Knossos, the crowning discovery—or, rather, series of discoveries—remains to be told. On the last day of March, not far below the surface of the ground, a little to the right of the southern portico, there turned up a clay tablet of elongated shape, bearing on it incised characters in a linear script, accompanied by numeral signs. My hopes now ran high of finding entire deposits of clay archives, and they were speedily realized. Not far from the scene of the first discovery there came to light a clay receptacle containing a hoard of tablets. In other chambers occurred similar deposits, which had originally been stored in coffers of wood, clay, or gypsum. The tablets themselves are of various forms, some flat, elongated bars, from about 2 to 7½ inches in length, with wedge-like ends; others, larger and squarer, ranging in size to small octavo. In one particular magazine tablets of a different kind were found—perforated bars, crescent and scallop-like "labels," with writing in the same hieroglyphic style as that on the seals found in eastern Crete. But the great mass, amounting to over a thousand inscriptions, belonged to another and more advanced system with linear characters. It was, in short, a highly developed form of script, with regular divisions between the words, and for elegance hardly surpassed by any later form of writing.

A clue to the meaning of these clay records is in many cases supplied by the addition of pictorial illustrations representing the objects concerned. Thus we find human figures, perhaps slaves; chariots and horses; arms or implements and armor, such as axes and cuirasses; houses or barns; ears of barley or other cereals; swine; various kinds of trees, and a long-stamened flower, evidently the saffron crocus, used for dyes. On some tablets appear ingots, probably of bronze, followed by a balance, and figures which probably indicate their value in Mycenean gold talents. The numerals attached to many of these objects show that we have to do with accounts referring to the royal stores and arsenals. (*Turn to page* 126)

Fig. 332. Restored View of Section of West Palace Wing facing Central Court, showing Columned Shrine and "Stepped Porch." By F. G. Newton.

Latest Knowledge of Plants Reported

Botany

Leading Botanists at World Congress in Cambridge

Americans Given Important Positions as Section Heads and Vice-Presidents—Last Congress Held at Cornell Four Years Ago

BACTERIA that find oxygen, the very breath of life to most organisms, to be a rank poison and that breathe hydrogen instead, have had their physiological secrets investigated by Prof. J. W. McLeod of the University of Leeds school of medicine.

Plants and animals take up oxygen simply as the readiest means of obtaining energy from food substances. These bacteria, which prefer places where there is little or no air, are able to get their needed energy by a different process. They detach hydogen from certain complex organic compounds, and the breaking apart of these molecules releases energy.

Oxygen is inimical to this process. If the newly released hydrogen comes into contact with oxygen the two elements unite to form hydrogen peroxide. Bacteria that can live in the presence of a very little air can tolerate a certain low concentration of hydrogen peroxide, but those that demand surroundings where there is no oxygen at all apparently find themselves paralyzed if hydrogen peroxide is generated even in small quantities.

A curious fact about these oxygen-hating bacteria is that they are quite lacking in one of the enzymes or organic ferments, catalase. This particular enzyme was once thought to be absolutely indispensable to any kind of life.

Missing Plant Links

"Missing links" plague students of plant evolution no less than they do those who concern themselves with the history of animals or of man. At the Botanical Congress, Prof. A. C. Seward of Cambridge University told of the difficulties of scientists in bridging the gap between the plant forms of the late Paleozoic, when the principal coal beds were formed, and those of the Mesozoic, or age of dinosaurs.

World climate, and the face of the earth itself, underwent revolutionary changes during that critical period in geological history, according to Prof. Seward, and the great changes in environmental conditions were reflected in the downfall of the earlier dynasties that had ruled the ancient forests and the rise of new and different dominating families. And the hereditary steps by which the new arose from the old cannot be traced in any fossil records which have yet been discovered.

Prof. Seward believes that the rocks of inner Asia, which have recently given up many of the early family secrets of the dinosaurs, may also yield some of the missing chapters in the story of plant evolution, once they are searched with sufficient care and understanding.

Tell-Tale Pollen

Stories of mighty hunters of old, who could shoot a deer when they could see nothing but its shadow, are matched in modern botanical science by men who can tell when and where there was a forest a hundred thousand years ago by searching for microscopic grains of fossil pollen in the peat of an ancient bog. The yellow fertilizing dust that settled on the waters and was drowned and absorbed into the muck on the bottom is read especially zealously to learn the movements of the great thickets of hazel that marched on the margins of the sub-arctic forests in the days when the glaciers were retreating from the face of Europe.

But it is not all plain sailing, this seeing of woods where only the fossil dust of its flowers remains. Dr. G. Erdtman of the University of Alberta told of some of the difficulties encountered in searching for vanished woods with a microscope.

It cannot be assumed, he says, that where there is much pollen there was a heavy growth of the plants that produced it, and that where there is none there were few or no such plants. If the bog into which the pollen fell was not in proper condition to receive and preserve it, the pollen would be lost and thus no record would remain. Such conditions would include a chemical or bacterial state of the water that would cause the pollen grains to decay, a frozen surface over the bog at the time of pollen-shedding, or one of a number of other circumstances. Therefore one's grain of pollen must sometimes be taken with a grain of salt.

Taking a Plant Census

Plant populations, not less than human populations, present problems for census enumerators. Whoever would understand the state of affairs in a plant community—say a forest, an area of grazing land, or a swamp—finds it necessary to adopt some methods that are like those of the census enumerator, and to follow others that are very different. Prof. E. J. Salisbury, one of England's best-known students of plant sociology, outlined the principles and practices of his science as he and other specialists in this field have worked them out.

Plant sociologists and ecologists often speak of the "physiognomy" of plant society. By this they mean just about what the word actually implies: what the vegetation looks like. The brushy growth in such different parts of the world as Arizona, South Africa and interior Australia is made up of quite different species of plants, yet the general appearance of the whole vegetation is similar for all three regions: tough, hardy bushes with small, harsh, drought-resistant leaves, interspersed with water-storing succulent plants like century-plants and aloes that look alike even though they are only remote cousins.

Another point of approach for the plant census taker is known as "Floristics." This consists of counting and naming the plants themselves, and in learning which ones are always

BACTERIA that breathe hydrogen and are poisoned by oxygen; how pollen which fell archaeological ages ago are helping scientists reconstruct "lost forests"; how leaves in the sun differ from those in the shade; the search for "missing link" plants—these are some of the subjects discussed by the botanists and reported in this issue. Another article on the Congress will be published in the Science News-Letter next week.

AMERICAN leaders in the study of plant life were accorded prominent places in the councils of the Fifth International Botanical Congress, which met in Cambridge, England, during the past week.

The presidency of the meeting was naturally given to the great university which is acting as host to the world botanists, in the person of Prof. A. C. Seward. The active work of the sessions was carried on in eight sections, and three of the eight section chairmanships were held by American scientists.

These were Prof. H. C. Cowles of the University of Chicago, section on plant geography and ecology; Prof. R. E. Buchanan of Iowa State College at Ames, bacteriology; and Prof. L. R. Jones of the University of Wisconsin, plant diseases and the fungi that cause them. There were also three Americans among the honorary vice-presidents: Prof. L. H. Bailey of Cornell University, Prof. R. A. Harper of Columbia University, and Dr. E. D. Merrill of the New York Botanical Garden.

Many American botanists attended this meeting, the first international gathering of its kind since the International Congress of Plant Sciences held at Cornell University, Ithaca, N. Y., four years ago. The Ithaca congress was the first international botanical meeting of the post-war period.

found together and which keep away from each other. Thus beech, maple and hemlock were constant companions in the old hardwood forest of Michigan, but oaks were not often found with them and willows never.

Stage by Stage

Another is the way in which one plant population yields place to another, just as a group of Sicilian immigrants may move out of a given part of a city before an oncoming wave of Mexicans or Negroes. This type of study is called "succession."

Successional series of plant communities may be traced by anybody around a pond that is slowly filling up. Out where the water is still deep there will be a zone of water-lilies. Closer inshore, arrow-leaf occupies the shallower margin. The marshy shore will support a population of cattails, sedges and rushes. Then will come a belt of button-bush, or willows, or alders. On slightly drier land will be soft maples, elms and box-elders. And finally is a permanent "climax" population of oaks and hickories, or perhaps maples and beeches. Each stage pushes the preceding one out as the land becomes fit to occupy, making the process a literal succession.

Treetops in a Desert

Every treetop lives in a desert, exposed to hot sun and drying wind; it is, moreover, farthest removed from the base of water supplies. It responds to these desert conditions by becoming more or less like a desert plant, Prof. Bruno Huber of the University of Freiburg has discovered.

An examination of leaves and stems from the tops of trees showed anatomical differences according to their location in sun or shade. "Shade leaves" were more like those on the parts of the tree closer to the ground and better sheltered from evaporation; "sun leaves" were protected in various ways from the drying effects of the air.

Sometimes they worked to keep down the rate of evaporation by means of thicker skins, smaller cells, tinier breathing-pores or stomata, etc., and sometimes they yielded to the air's demand for water but had better facilities for renewing the supply from beneath. Prof. Huber calls attention to the fact that plants of both types can sometimes be found growing side by side in places where the evaporation rate is high.

Another Evolution Theory

Evolution through crossing of dissimilar parents, a rival theory to the continuous-variation idea of Darwin and the sudden-mutation mode advocated by DeVries, is upheld by a noted Dutch botanist, Dr. J. P. Lotsy, who spoke before the Congress.

Dr. Lotsy points out that our idea of a species is based on the assumption that all individuals that look very much alike have had a common descent. We see the grandchildren and take the ancestors for granted. Beginning at the other end, he selects ancestor-plants and traces the development of new character-combinations in their descendants. In spite of the plausibility of the mutation theory, he insists, it has never been proved that a new form of specific rank has arisen in this manner. The only new forms whose origin has been actually observed, he says, have been produced by hybridization, though even these are not of specific rank.

Dr. Lotsy regards it as quite possible that the main divisions of the organic kingdom originated by hybridization. In many of the lower forms of life, from which the higher ones are assumed to be derived, the cell protoplasm as well as the nuclei unite during the reproductive process. This, Dr. Lotsy states, furnishes a possible mechanism for the development of the major differences that separate the great divisions of the plant and animal kingdoms.

How to See Cells

How living plant cells can be induced to absorb dyestuffs making their usually invisible workings possible of examination with the microscope, was discussed by Prof. Hans Pfeiffer of Bremen, Germany. Prof. Pfeiffer reviewed the work of a number of his colleagues as well as his own most recent researches, and discussed the difficulties sometimes encountered in getting living protoplasm to take up coloring matter rapidly enough, or evenly enough, or without damage to itself.

How Much Rain Will Break Drought?

Meteorology—Public Health

Dry Weather May Cause More Milk Sickness

EVEN NORMAL rainfall now would not relieve the drought greatly, because it would not make up for the deficiency of past months, C. L. Mitchell, principal meteorologist at the U. S. Weather Bureau told Science Service.

"One question that comes up now," he said, "is how much rain would be needed to really break the drought. Even if a half inch fell over a wide area, I would hesitate to say that it was broken, for a week later there would be no effect of it left. Normally at this time about a half inch falls in a week, so that would merely prevent conditions from getting worse. Far heavier rains are needed, in order to make up for the weeks in which this half inch has not fallen.

"In Arizona and Utah, where there have been cloudbursts recently it is a result of the warm air from the south meeting colder air from the northwest, but these are all beyond the Rockies. They will help the cattle in that region, but they will not help the corn and wheat growing areas farther east.

"The heat wave is entirely gone, and it is cool now over a large area, as a result of the high pressure area. But there is still no real disturbance, or low, to work in conjunction with this and bring real rains."

Poison From Snake Root

Milk sickness, a disease contracted by drinking infected milk, or dairy products made from such milk, is likely to increase in many parts of the country as a result of the drought, Dr. James F. Couch, of the Bureau of Animal Industry, told Science Service.

The poisonous milk comes from cows that have eaten the white snake root, he said. This plant occurs mainly in Ohio, Illinois, Indiana, Kentucky, parts of Tennessee and eastern Missouri. As the drought cuts the supply of the usual feed of the stock, the animals will eat more of other plants than normally, and so are likely to consume large quantities of the white snake root. Hence the danger, and the need for caution on the part of dairymen.

The danger is particularly acute in rural regions in these states, Dr. Couch declared, but in the cities the strict inspection of dairy products will probably cause less risk.

Symptoms of the disease in human beings include nausea, pain in the epigastrium (commonly known as "belly-ache"), weakness and headache. Cattle that have the disease are weak, and show fits of trembling. They take no exercise. Unfortunately, however, the cows may not show these symptoms until after they have given the poisonous milk. Dr. Couch stated that he knew of a case in which a whole family was taken sick and one member died before the cow that gave the milk showed any signs at all. Therefore dairy farmers should be very careful of what their cattle eat.

Science News-Letter, August 23, 1930

The Labyrinth of Minos—*Continued*

Some tablets relate to ceramic vessels of various forms, many of them containing marks indicative of their contents. Others, still more interesting, show vases of metallic forms, and obviously relate to the royal treasures. It is a highly significant fact that the most characteristic of these, such as a beaker like the famous gold cups found in the Vapheio tomb near Sparta, a high-spouted ewer and an object, perhaps representing a certain weight of metal, in the form of an ox's head, recur—together with the ingots with incurving sides among the gold offerings in the hands of the tributary Ægean princes—on Egyptian monuments of Thothmes III's time. These tributary chieftains, described as Kefts and people of the sea, who have been already recognized as the representatives of the Mycenean culture, recall in their dress and other particulars the Cretan youths, such as the cupbearer above described, who take part in the processional scenes on the palace frescoes. The appearance in the records of the royal treasury at Knossos of vessels of the same form as those offered by them to Pharaoh is itself a valuable indication that some of these clay archives approximately go back to the same period—in other words, to the beginning of the fifteenth century B. C. . . .

The Sacred Writing

The signs already mentioned as engraved on the great gypsum blocks of the palace must be regarded as distinct from the script proper. These blocks go back to the earliest period of the building, and the symbols on them, which are of very limited selection, but of constant recurrence, seem to have had a religious significance. The most constantly recurring of these, indeed, is the labrys or double ax already referred to—the special symbol of the Cretan Zeus, votive deposits of which in bronze have been found in the cave sanctuaries of the god on Mount Ida and Mount Dicta. The double ax is engraved on the principal blocks, such as the corner stones and door jambs throughout the building, and recurs as a sign of dedication on every side of every block of a sacred pillar that forms the center of what seems to have been the inmost shrine of an aniconic cult connected with this indigenous divinity.

The "house of Minos" thus turns out to be also the house of the double ax—the labrys and its lord—in other words, it is the true Labyrinthos. The divine inspirer of Minos was not less the lord of the bull, and it is certainly no accidental coincidence that huge figures of bulls in painting and plaster occupied conspicuous positions within it. Nay, more, on a small steatite relief, a couchant bull is seen above the doorway of a building probably intended to represent the palace, and this would connect it in the most direct way with the sacred animal of the Cretan Zeus.

There can be little remaining doubt that this vast edifice, which in a broad historic sense we are justified in calling the "palace of Minos," is one and the same as the traditional "labyrinth."

Science News-Letter, August 23, 1930

NATURE RAMBLINGS

By Frank Thone

Frigates of the Air

ALONG our southern coasts one can often see great fleets of beautifully constructed living airplanes, with narrow wings stretching to an over-all reach of six or seven feet and long, deeply forked tails. They are kinsfolk of the pelicans, known variously as man-o'-war birds and frigate birds.

These names, however, are undeserved libels on honest fighting men, for these birds are really corsairs. They do not seek their living honestly as fishermen, but follow flocks of such birds as cormorants and gulls, swooping fiercely at them and compelling them to disgorge their prey. Then they dive at the falling fish and catch it in the air. It may be for this habit that they have received the name *Frigatta aquila;* for the second of the Latin names means an eagle, and our proud bald eagle has the same disgusting and dishonest way of getting its food. Or the name may refer only to the hook at the end of the frigate bird's long beak and to its wide wings.

As a matter of fact, the frigate bird can outsoar any eagle. It rivals the buzzard in its ability to remain aloft for hours without flapping a wing, taking advantage of every vagrant air current, as human glider pilots have learned to do.

The frigate birds of our shores are believed to nest altogther in the Bermudas, though it is possible that they may also have breeding grounds on some of the islands off the Louisiana coast. But they love to congregate along the keys and sandy islands of Florida, where their dark brown fleets may be seen at almost any time. There are also smaller frigate birds that have their headquarters in the southern hemisphere.

Science News-Letter, August 23, 1930

Electric Clock Set By Radio Signals

Radio

LISTENING to the Naval Observatory radio time signals and then setting your clock by hand is now unnecessary. At the meeting of the Institute of Radio Engineers in Toronto, Canada, H. C. Roters and H. L. Paulding, of the Stevens Institute of Technology, described a radio electric clock system in which this is done automatically, and without attention. Every day the clock is reset to the exact second by the noon time signals.

One of the chief problems encountered, it was said, was in working out some method by which the apparatus would not respond to static, or interfering signals on the same or a very close frequency. The clock itself turns on the radio set at exactly 11:55 a. m., eastern standard time, when the signals start, and turns it off at noon, but static occurring during this period might interfere.

The problem was solved, however, by what the engineers call a "pulse frequency amplifier." This is the final stage of amplification, and is arranged so that impulses coming once a second are amplified most, while if they come at 16 times or more a second, they are not amplified at all. Two pulses a second are amplified about 95 per cent. as much as those coming in once a second. As static, and interfering code or voice signals, do not possess this regularity and the proper frequency, they are almost completely suppressed.

After passing through the pulse frequency amplifier, the signals operate a selector, which picks out the signal marking the beginning of a minute following the five second pause after the fifty-fifth second. This impulse sets the clock. It is said that a correction of as much as 25 seconds one way or the other is possible, though a good master clock should not vary more than a second a day. From the master clock, any number of slave clocks can be operated by methods now commonly in use.

Science News-Letter, August 23, 1930

Strictly American

INDIAN architects and sculptors of the American tropics in prehistoric times had strikingly original ideas. On the cover you see the entrance to the beautiful Temple of the Warriors at Chichen Itza, in Yucatan.

The Toltecs, who conquered the Mayas at Chichen Itza, remained in the city and added greatly to its beauty, forcing Mayan craftsmen to execute their orders. Toltec ingenuity devised the serpent columns, shown at the temple gate. The serpents, standing acrobatic-fashion on their chins, were designed for the honor of the great deity, the Plumed Serpent. The pose represented to the Indian imagination the descent of the Serpent, whose feathers enabled him to fly down to earth to bless his chosen people. When you recall the three famous types of Greek columns used over and over in Europe, you can see that an invention of a column type is an achievement and an architectural event.

The Chac Mool, the figure of a man seated with his knees drawn up, and a bowl for offerings or incense lying in his lap, is still a riddle to modern archaeologists. Dr. Herbert Spinden, of the Brooklyn Museum, has surmised that this queer sculptor's creation may have been connected with a peculiar Toltec cult in which drunkenness figured. A number of these Indian "sphinxes" have been found, but none with any conclusive clues to their meaning and use.

Archaeology

Science News-Letter, August 23, 1930

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FIRST GLANCES AT NEW BOOKS

MENTAL RADIO—Upton Sinclair—*Author,* 239 p., $3. The versatile Mr. Sinclair has gone in for mental telepathy with his wife who claims to have a gift for it. This book gives an account of their experiments and methods and is entertaining, regardless of whether one agrees with the Sinclairs or not. The introduction by Dr. William McDougall, professor of psychology at Duke University, will give the reader an indication of the scientific value and possibilities of the book.

Psychic Research
Science News-Letter, August 23, 1930

THE UNREALISTS—Harvey Wickham — *Lincoln MacVeagh,* 314 p., $3.50. Attacks upon "the generals of modernistic thought." The author does not agree with James, Bergson, Santayana, Einstein, Bertrand Russell, John Dewey, Alexander and Whitehead.

Philosophy
Science News-Letter, August 23, 1930

OCEANIA—Australian National Research Council—*Macmillan and Co., Ltd., Melbourne,* 128 p., 7s., 6d. This is volume one number one of a new journal devoted to the study of the native peoples of Australia, New Guinea and the islands of the Pacific. It provides a medium for the publication of the results of the researches in that field carried out under the auspices of the Australian National Research Council made with the aid of grants from the Rockefeller Foundation in New York, which duplicated the amount provided in Australia itself for these studies. An editorial in the new journal says: "These investigations are perhaps not of any immediate practical use, for the Australian aborigines, even if not doomed to extinction as a race, seem at any rate doomed to have their cultures destroyed. But they will provide data of the very greatest importance for a comparative science of culture. A real understanding of civilization will only be attained by comparison of as many diverse types as possible. Australia presents a primitive but highly specialized culture of one general type throughout the continent, but showing a great number of local variations. A systematic study of these variations can give us results that may fairly be compared with those obtained in other sciences by the experimental method. The study of Australian social organization, besides its great value for the science as a whole, is also likely to be of help by throwing some light on the problems of New Guinea. Recent investigations have done much to confirm the view that there is an intimate relation between the cultures of New Guinea and Melanesia and that of Australia. Unfortunately many Australian tribes have already disappeared, and it is now forever impossible to discover anything about them. Many more are approaching extinction or are rapidly losing all memory of their former customs and even language. Whatever studies are to be made of the Australian natives must be completed within the next few years."

Ethnology
Science News-Letter, August 23, 1930

THE ORGANIZATION OF A RURAL TUBERCULOSIS SERVICE—Stephen A. Douglass—*Milbank Memorial Fund,* 86 p. Limited quantities available for gratis distribution. An account of the work under the first comprehensive rural program for the control of tuberculosis in New York State. The demonstration made in Cattaraugus county, is one unit of the New York Health Demonstrations to which the Milbank Memorial Fund has made appropriations. The report will be useful to other rural communities and those engaged in tuberculosis control work in them.

Public Health
Science News-Letter, August 23, 1930

THE SCIENCE OF BIOLOGY—George G. Scott—*Crowell,* 633 p., $3.75. Second revised edition of an introductory text. The author maintains that the more important biologic problems cannot be well appreciated without a background of simpler, more general problems. Consequently the first two parts still present the biology of plants and of animals as a whole. The last part has been enlarged and includes the discussion of the cell and of protoplasm. The many illustrations are made clearer by direct labeling of each figure.

Biology
Science News-Letter, August 23, 1930

WEATHER AND HEALTH—Ellsworth Huntington—*National Research Council,* 161 p., $2. The ever-fascinating problem of the relation of the weather to man's health is here considered from a study of daily mortality in New York City. The monograph forms Bulletin 75 of the National Research Council's series. It was prepared under the direction and with the advice of the committee on the atmosphere and man, division of geology and agriculture, National Research Council.

Meteorology—Health
Science News-Letter, August 23, 1930

GROWING STRAIGHT—Maud Smith Williams—*Barnes,* 137 p., $2. A system of physical education with mental control based on methods of the North American Indians. The author states that she has learned these methods from the Indian sages and medicine men. It seems at least doubtful whether the Indians have rationalized their exercises and physical training to the extent given in this book. The exercises do not appear to be new, but the Indian treatment may give them fresh popularity, particularly with children. One hundred and thirteen exercises are given and one wonders whether this large number may not dampen the beginner's enthusiasm.

Physical Education
Science News-Letter, August 23, 1930

INTRODUCTORY ECONOMIC GEOLOGY—W. A. Tarr—*McGraw-Hill,* 664 p., $5. A new textbook on economic geology presenting a great mass of well-selected material, arranged under the group heads History and Origin, Metallic Materials and Non-Metallic Materials. The presentation is terse, business-like and readable, and the illustrations either diagrams or drawings of diagrammatic economy and clearness.

Geology
Science News-Letter, August 23, 1930

CHEMISTRY FOR TODAY—McPherson, Henderson and Fowler—*Ginn,* 588 p., $1.80. A textbook for secondary schools which seems to keep modern practical applications of chemistry well to the fore, although the first chapter is about alchemy, and the historic facts are not slighted.

Chemistry
Science News-Letter, August 23, 1930